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ABSTRACT

The Michigan Alcoholism Screening Test (MAST) was designed to serve as a reliable and quantifiable measure of alcohol dependence (M. Selzer, 1971). Since its introduction, the psychometric properties of the MAST have been studied extensively, but there are several questions that have not been addressed or only partially answered. The purpose of this study was to evaluate critically the MAST's psychometric usefulness. Subjects were 94 continuous clients presenting for a chemical dependence assessment at a community mental health and addictions treatment center. The results suggest that the MAST is a psychometrically sound instrument, useful for screening for the presence of alcohol related problems in an outpatient population. Results also indicate that the MAST is unable to overcome client defensiveness or denial. Implications for counselors and suggestions for future research are discussed. (Contains 3 tables, 2 figures, and 74 references.) (SLD)

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The Michigan Alcoholism Screening Test (MAST): A Psychometric Investigation

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Abstract

The MAST was designed to serve as a reliable and quantifiable measure of alcohol dependence (Selzer, 1971). Since its inception, the MAST's psychometric properties have been studied extensively. However, there are several questions about the MAST that have been either been unanswered or only partially addressed. The purpose of this article is to critically evaluate the MAST's psychometric usefulness. The results suggest that the MAST is a psychometrically sound instrument useful for screening for the presence of alcohol related problems in an outpatient population. Our results also indicate that the MAST is unable to overcome client defensiveness and/or denial. Implications for counselors and suggestions for future research are provided.

The Michigan Alcoholism Screening Test (MAST):

A Psychometric Investigation

Of the more than 54 million Americans who have a diagnosable mental illness, approximately eight million will seek counseling this year (NMHA, 2002). Fifteen percent of these treatment seekers will experience a co-occurring substance disorder (Beeder & Millman, 1992: NMHA, 2002). While not all counselors can be experts at diagnosing and treating alcohol abuse and dependence, Piazza (2002) asserted that the failure to screen for the presence of alcohol dependence may lead counselors to misdiagnosis their clients' presenting concerns and subsequently provide less than optimum care.

According to Horrigan, Piazza, Weinstien (1996), screening for substance disorders is a process of assigning a client to a given category. More specifically, the purpose of screening is to identify individuals who require further chemical dependence assessment (Adger & Werner, 1994). Regardless of counselors' areas of expertise, the high likelihood that they will encounter many dually diagnosable clients in their careers suggests that an essential counseling skill should be the ability to screen clients to determine who is and who is not experiencing problems related to substance abuse and/or dependence (McLellan & Dembo, 1992).

Counselors interested in using a brief, easy to administer and score measure of alcohol abuse and dependence are faced with a wide variety of choices. Some of the most well-known and well-researched instruments currently available include the CAGE (Ewing, 1984), the AUDIT (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993), the TWEAK (Russell et al. 1994), the T-ACE (Sokol, Martier, & Ager, 1989), the

Substance Abuse Subtle Screening Inventory-3 (SASSI-3: Miller & Lazowski, 1999) and the Michigan Alcoholism Screening Test (MAST: Selzer, 1971). Of these various choices, the MAST is the most often and widely selected instrument (Brady, Foulks, Childress, & Pertschuk, 1982; Piazza, Martin, & Dildine, 2000; Thurber, Snow, Lewis, & Hodgson, 2001).

The MAST was designed to serve as a reliable and quantifiable measure of alcohol dependence (Selzer, 1971). The MAST contains 25 face-valid true/false questions about alcohol consumption and related behaviors. It is estimated that clients can complete the MAST in 10 to 15 minutes (Hedlund & Vieweg, 1984). Items are assigned scores ranging from 0, 1, 2, or 5 points, with the total scores ranging from 0 to 53. The total score is the sum of each individual item scores. Selzer's original scoring system classified total scores of zero through three as representative of social drinking, four as borderline or suggestive of alcohol abuse, and a score of five or more as a clear indication of alcohol abuse. Later, however, the MAST scoring system was adjusted such that the following range of scores is generally used by clinicians: 0-4, not alcohol dependent, 5-6 maybe alcohol dependent; 7 or more, alcohol dependent (Hedlund & Vieweg, 1984; Selzer, Vinokur, & Rooijen, 1975).

Since its inception, the MAST's psychometric properties have been studied extensively. Articles summarizing the populations in which the MAST has been studied appeared in 1982 (Brady, Foulks, Childress, & Pertschuk) and 1984 (Hedlund & Vieweg). While representing exhaustive reviews of the literature at the time, none of the referenced studies compared the MAST's performance against other psychological measurers of alcohol dependence. In 1991, Svikis, McCaul, Turkkan, and Bigelow found

that persons who had alcohol dependent first degree family relatives answered many of the MAST's items in such as way that reflected their family member's alcoholism and not their own drinking histories. These authors recommended that the MAST items be clarified such that the items ask specifically about the client's own drinking history. Thurber, Snow, Lewis & Hodgson (2001), using confirmatory factor analysis, reported results supportive of the notion that the MAST reflects a single latent variable of alcohol dependence. This finding is contrary to exploratory factor analytic findings (Parsons, Wallbrown, & Myers, 1994; Zung, 1978, 1980a, b) that suggested that the MAST measures many facets of alcohol dependence.

Another concern regarding the interpretation of the MAST is the issue of its face-validity. Otto and Hall (1988) demonstrated that when motivated to do so, alcohol dependent persons are able to respond to the MAST in such as way as to avoid detection. Such findings raise questions regarding the usefulness of a face-valid instrument when screening for alcohol-related problems.

Despite earning a reputation in the drug and alcohol treatment community as the gold standard against which all other assessment instruments are compared (Martin, Liepman, & Young, 1990), our review of the literature revealed several issues about the MAST that have been either been partially addressed or wholly unanswered. First, several authors have suggested that due to the ambiguous wording, MAST scores may be elevated due to alcohol dependence in a client's immediate family, rather than due to the client's own drinking behaviors (Martin, et al. 1990; Sher, & McCrady, 1984; Svikis, McCaul, Turkkan, & Bigelow (1991). Our review of the literature failed to produce

evidence of any study that attempted to uncover a relationship between positive family history of alcohol dependence and MAST scores.

Second, Thurber, et al. (2001) raised concerns regarding the homogeneity of the MAST due to the frequency with which certain items are endorsed. Items that are infrequently endorsed add little to the overall ability of an instrument to discriminate between clients' presenting concerns (DuBois, 1965).

Third, the MAST has been criticized for identifying only clients who already believe they have alcohol-related problems (Friedrich & Loftsgard, 1978; Kaplan, Pokorny, Kanas, & Lively, 1974). As such, the MAST may be more a measure of willingness to admit to alcohol dependence, rather than a pure measure of alcohol dependence in and of itself.

Fourth, it has been argued that the MAST is sensitive to demographic variables. Previous research (Gomberg, 1993; Lemle, & Mishkind, 1989; Lex, 1994, McCreary, Newcomb, & Sadava, 1999; Wilke, 1994) has demonstrated that men and women experience alcohol dependence and the concomitant symptoms and consequences very differently. The original standardization sample was primarily composed of males convicted of driving under the influence (Selzer, 1971). As such, it may be possible that the MAST is measuring something different in males than it does in females. Additionally, examining individuals from more varied educational backgrounds and age groups may affect MAST results. For instance, better-educated people may be more likely to identify the signs and symptoms of alcohol dependence (Friedrich & Loftsgard, 1978). Likewise, older persons are likely to have had more time to develop symptoms associated with chronic alcohol dependence (Milam & Ketcham, 1983). Thus, the

MAST's usefulness with young and under educated clients is suspect (Friedrich & Loftsgard, 1978; Hirata et al. 2001).

Fifth, face-valid instruments, such as the MAST, are subject to questions regarding their utility in populations that might have a vested interest in minimizing their presenting concerns, a concept known as "impression management" (Graham, 1993; Groth-Marnat, 1997). In addition to minimization, client denial about the scope and depth of their alcohol-related problems may contribute to a face-valid alcohol abuse assessment instrument to misrepresent a client's presenting problems (Shedler, Mayman, & Manis, 1993). These concerns raise questions regarding the MAST's psychometric accuracy with clients who may be motivated to minimize the nature of their troubles (Carver & Scheier, 1996; Corsini & Wedding, 1995; Royce, 1989; & Wiseman, Souder, & O'Sullivan, 1996), or who may be in denial of their alcohol related problems (Friedrich & Loftsgard, 1978; Otto & Hall, 1988; Selzer, Vanosdall & Chapman, 1971; Tulevsi, 1989).

Responding to concerns that the MAST's global score may pose limitations by erroneously classifying persons in a homogenous fashion, the MAST's underlying factor structure has been examined via exploratory factor analysis (EFA; Frederick, Boriskin, & Nelson, 1978; Skinner, 1979; Zung, 1978, 1980a,b, 1982; Zung & Ross, 1980). To our knowledge, only one study (Thurber, et al. 2001) subjected the MAST to confirmatory factor analytic techniques (CFA). CFA is the preferable statistical method for use when the research either tests hypothesises or when an empirical foundation has been laid by previous research. (Stevens, 1996; Tinsley & Tinsley, 1987). While the MAST's construction was atheoretical, previously researchers (Parsons, Wallbrown, & Myers, 1994; Snowden, Nelson, & Campbell, 1986; Thurber, et al., 2001. Zung 1978, 1980;

Zung & Ross, 1980) have reported factor structures that have yet to be replicated in an outpatient client setting.

Therefore, the purpose of this article is five-fold. First, we will test the relationship between family history of alcohol dependence and MAST scores. Particular attention will be paid to those MAST items thought to be potentially misleading. Second, we will determine whether those clients who presented for treatment recognizing themselves to be alcohol dependent scored differently on the MAST than those who do not. Third, in order to determine whether MAST scores can be biased by persons who are in denial or those who may be inclined to minimize their alcohol dependence, (Carver & Scheier, 1996; Corsini & Wedding, 1995; Milam & Ketcham, 1983; Royce, 1989; & Wiseman, Souder, & O'Sullivan, 1996; Schaefer, 1987), we will determine whether there is a relationship between client defensiveness and MAST scores. Fourth, the relationship between MAST scores and the demographic variables gender, age, and education will be investigated. And, fifth, we will employ confirmatory factor analytic techniques to determine whether previously uncovered MAST factor structures can be replicated in an outpatient population.

Method

Participants

Ninety-four continuous clients presenting for a chemical dependence assessment at a community mental health and addictions treatment center were recruited for this study. Seventy-one percent of this population (n = 67) were men. The mean age was 32.6 years (SD = 9.2, range = 18-59). Most clients were married or living as married (n = 33; 35.1%). Twenty-six were single or non-partnered (27.7), 29 (30.8%) were either

separated or divorced, one was widowed (1.1%) and five (5.3%) did not identify a partnership status. Ninety-two (98%) clients self-identified as European American, one (1%) identified as African American, and one (1%) identified as Native American. The mean education level was 11.7 (SD = 1.3, range = 8-14).

Procedure

Clients receiving assessment services at a county community mental health and recovery services center of a small Midwestern city were asked to participate in this study. An assessment packet, which included an informed consent form, the MAST (Selzer, 1971), the SASSI-3 (Miller & Lazowski, 1999), and a Demographic Data Questionnaire, was completed at intake. One hundred percent of the subjects agreed to complete the assessment packet.

Instruments

The Substance Abuse Subtle Screening Inventory-3 (SASSI-3: Miller & Lazowski, 1999) was initially published in 1985 and is now in its second revision. It was designed to provide a wide range of information regarding a respondent's drug and alcohol use patterns. The SASSI-3 was constructed using a combination of the criterion keying and rational methods. It requires minimal time to complete (approximately 15 minutes) and it is easy to score and interpret, a process requiring about two minutes. The SASSI-3 is particularly useful to this investigation because, in addition to identifying clients who overtly express conditions of alcohol dependence, its authors promote it as being able to identify clients who have a high likelihood of having a substance disorder even if those clients deny substance misuse or symptoms associated with it.

The SASSI-3 (Lazowski, Miller, Boye, & Miller, 1998) consists of a twelve-item Face Valid Alcohol Scale and a fourteen-item Face Valid Other Drug scales. Clients were instructed to indicate whether they have "never, once or twice, several times, or repeatedly"…experienced the situation described in each face-valid item. The second side of the instrument has sixty-seven questions that are seemingly unrelated to alcohol or other drug use. These true/false items comprise eight empirically established scales (Miller, Roberts, Brooks & Lazowski, 1997). These are the Symptoms (SYM), Obvious Attributes (OAT), Subtle Attributes (SAT), Defensiveness (DEF), Supplemental Addiction Measure (SAM), Family vs. Control Subjects (FAM), and Correctional (COR) scales. A measure of validity is conducted by checking items that load on the Random Answering Pattern (RAP) scale. The SASSI-3 manual (Miller, 1985; Miller & Lazowski, 1999) suggests that a score of two or more on the RAP scale may indicate that the client did not respond to the SASSI in a meaningful manner.

The SASSI-3 has a series of nine decision rules that indicate the likelihood of the client having a substance dependence disorder. Some of the rules are based solely on the scales that represent obvious recognition of abuse or dependence on the part of the client. Others are based on scales that are designed to circumvent a client's defensiveness and/or denial. Finally, some of the decision rules are based on a combination of the obvious and subtle scales. According to Miller and Lazowski (1999) if none of the decision rules are endorsed, there is a "low probability of having a substance dependence disorder" (p. 10). Conversely, these authors report that if any one or more of the nine rules is endorsed, the client is viewed as having a "high probability of having a substance dependence

disorder"(p. 10). In this manner, clients who "test positive" on the SASSI-3 can be categorized as having done so in an obvious or subtle manner.

Another strength of the SASSI-3 is that it offers counselors the confidence that 98% of those who test positive on the SASSI-3 will meet DSM-IV (Author, 1994) criteria for chemical dependence (Miller & Lazowski, 1999). Additionally, the SASSI-3 offers substantial sensitivity and specificity. Ninety-four percent of those with a diagnosable substance dependence disorder will test positive on the SASSI-3. Of those who do not meet DSM-IV criteria for substance dependence, 94% will test negative on the SASSI-3. Finally, for those who test negative on the SASSI-3, the probability is 80% that they do not meet DSM-IV criteria for substance dependence. The present researchers are confident that the participants in this study who test positive on the SASSI-3 are very likely to be diagnosable with substance dependence disorder.

For the purposes of this study, we will be using the clients' overall classification ("high or low probability of having a substance dependence disorder") as well as the FVA, FAM and DEF scales which are discussed below.

The Face Valid Alcohol (Miller & Lazowski, 1999) scale provides information on clients' overt efforts to communicate the degree to which alcohol consumption has impacted their lives. Low scores may be interpreted as a client's assertion that she does not have any alcohol-related problems. Conversely, high scores should be viewed as a client's acknowledgement that alcohol use has caused significant life difficulties. Due to its face-valid nature, this scale's data should be interpreted in the context of the client's entire presenting clinical picture.

The Family vs. Control Subjects (FAM) scale was developed by selecting SASSI-3 items that discriminate between persons who were known to be family members of substance abusers, but not substance dependent themselves, and those who were neither substance abusers nor related to a substance abuser (Miller & Lazowski, 1999).

The SASSI-3 literature provides descriptive material for both low and high Defensiveness (DEF) scores (Miller & Lazowski, 1999). High scores on these eleven items suggest that the respondent may have been motivated to hide evidence of personal problems and limitations. Such persons may lack insight and self-awareness. Low DEF scores are produced by persons who are relatively extreme in their disposition to emphasize personal limitations and defects.

Results

The means, standard deviations, and range of MAST total scores and SASSI-3 subscores for this sample are presented in Table 1. The distribution of MAST scores is represented in Figure 1. Cronbach's alpha for the MAST in this population was .88 indicating that the MAST items were focused on a single idea or construct. Using the suggested cutoff of seven (Madrid, Macurry, Lee, Anderson, & Comings, 2001; Ross, Gavin, & Skinner, 1990; Tulevski, 1989), the MAST categorized 72 percent (n = 68) of this sample as alcohol dependent. Using the SASSI-3 decision rules, 49 percent (n = 46) of this sample were categorized as likely alcohol dependent.

Insert Table 1 Here

Insert Figure 1 Here

The first purpose of this article was to examine the relationship between family history of alcohol dependence and MAST scores. Persons who have an alcohol dependent first-degree relative may answer questions on the MAST differently than those who do not. For example, accompanying a partner to an Alcoholics Anonymous meeting (question # 9) would earn five points towards the MAST's total score. This would account for 71% of the total score needed for a MAST classification as alcohol dependent. Additionally, by stating that drinking has created problems with friends or family (question # 11), or, due to personal abstinence from alcohol use a person does not feel they are a normal drinker (question 1), the total MAST score would classify this person as a problem drinker. Therefore, it is important to know whether people who are not alcohol dependent produce scores on the MAST that are associated with family substance use and not their own drinking behaviors.

To answer the question regarding the relationship between family history of alcohol dependence and MAST scores, we created a subsample (n = 48) of clients who were classified by the SASSI-3 as having a low probability of being substance dependent. Next, to determine if there is a relationship between positive family history of alcohol dependence and MAST scores, we correlated these SASSI negative clients' MAST scores with their SASSI-3 FAM scale. The results a Pearson Product moment correlation between MAST and FAM scores was not significant ($r = -.075$, $p = .612$). The failure to uncover a relationship between MAST scores of those classified as having a low probability of being alcohol dependent by the SASSI and scores on the FAM scale provides initial evidence that positive family history of alcohol dependence does not artificially elevate MAST scores. However, a mean score of 8.7 in the SASSI negative

group is still above the recommended MAST cut score for alcohol dependence. As such, we decided to investigate the mean MAST scores for the SASSI-3 negative and positive groups. The mean MAST score for those SASSI-3 negative subjects was 8.7 (SD = 4.7, range = 0 – 21). The mean MAST score for those SASSI-3 positive subjects (n = 47) was 23.1 (SD = 15.5, range = 0 – 52). The results of an independent t-test indicated that the mean MAST score from the SASSI-3 positive group were significantly higher than the mean MAST score of the SASSI-3 negative group ($t = 21.75$, df = 92, $p < .001$). We concluded that while the SASSI-3 negative group's MAST mean score was above the recommended cutoff score, there was a clear and significant difference between the mean MAST scores of the SASSI-3 negative and positive groups. The mean MAST score of 8.7 in the may explain why we found such a large difference between the classification rates of the MAST and the SASSI.

Our second question focused on each individual MAST items' psychometric value to the overall MAST score. Our review showed that four questions (15, 18, 19, 22) were endorsed by less than 10% of the total sample. These questions, respectively, cover the domain areas of job loss, liver trouble, delirium tremens (DTs), and having been a psychiatric inpatient. By and large, these are complications of late-stage alcohol dependence (Milam & Ketcham, 1983) and therefore are not applicable to persons not diagnosable as alcohol dependent, or those whose alcohol dependence is not in an advanced stage.

The purpose of the third question was to determine whether the MAST identifies only those persons who already recognize that they have an alcohol-related problem. To answer this question, we re-classified the SASSI results using only those SASSI decision

rules that include the subtle scales. In this manner, those SASSI profiles that would have been identified as "likely dependent" solely on the basis of the face-valid scales were now scored as SASSI negative. This created a new group who, when given a face-valid manner in which to acknowledge any alcohol-related problems denied such but were later classified by the SASSI subtle criteria only as likely dependent. SASSI profiles that were originally scored as negative remained so. This process produced 41 (44%) positive and 52 (55.9%) negative SASSI profiles. The number of MAST profiles scored as positive (n = 67; 72%) and negative (n = 26; 27%) did not change.

Next, we computed a kappa statistic between the MAST and the new SASSI-3 classification rates. The Kappa statistic is a method for estimating the amount of agreement between two measures beyond what would be expected by chance (Carletta, 1996; Cohen, 1960; Magruder-Habib, Fraker, & Peterson, 1983). Altman (1991) presented the following rubric for kappa interpretation: 1 indicates perfect agreement between to instruments; .8 – 1 is very good; .6 - .8 is good, .4 - .6 is moderate; .2 - .4 is fair; and, less than .2 is poor agreement. The SASSI and MAST agreed in their identification of 18 (19.4%) subjects as non-dependent and 33 (35.5%) subjects as dependent for an overall agreement rate of 51 cases (54.8%). The SASSI identified eight (8.6%) subjects as dependent that the MAST identified as non-dependent and the MAST identified 34 (36.6%) subjects as dependent that the SASSI classified as non-dependent. The overall disagreement rate between the MAST and SASSI-3 was 45% (n=42). The proportion of agreements after chance was excluded was 14.2%, Kappa (N=93) = .142, p = .107. These results indicate that the MAST and the adjusted SASSI agreed in their classification rates no more than would be expected by chance.

Another approach to determining the MAST's vulnerability to "faking good" is to investigate whether a relationship exists between MAST scores and a known measure of defensiveness. To this end, we computed a two-tailed Pearson Product-moment correlation coefficient between MAST scores and the DEF scale of the SASSI. Our results showed a significant inverse relationship between MAST scores and the DEF scale scores. That is, as our clients' level of defensiveness increased, their MAST scores decreased ($r = -.486$, $p < .001$). In this population, defensiveness accounted for approximately 23.6% of the total variance in MAST total scores.

The relationships between the MAST and gender, education, income and age were explored using two-tailed Pearson Product-moment correlation coefficients. We found no statistically significant relationships between MAST scores and gender ($r = .11$, $p = .30$), education level ($r = .16$, $p = .14$), income ($r = .05$, $p = .61$) and age ($r = .19$, $p = .07$).

The final purpose of the present study was to examine the factor structure of the MAST. Specifically, we wished to see whether the present data were consistent with factor structures that have been previously reported in the literature. The observed factor structure of the MAST in the present sample was as follows:

Insert Table 3 Here

In the present sample, the MAST produced four factors with eigen values above 1; however, the first factor clearly accounted for substantially more variance than the remaining factors (55.39% versus 12.53%, 8.79%, and 7.97%). Using Catell's (1966)

scree test, it can be concluded that the present data supports a strong primary factor with weak secondary factors. Previous research on the MAST has repeatedly found a strong primary factor/component with weaker secondary factors and little consistency in the structure of the secondary factors (Friedrich, Boriskin, & Nelson, 1978; Skinner, 1979; Zung, 1978, 1980, 1982). In light of this, Thurber et al. (2001) performed a confirmatory analysis to test the homogeneity of the items and found that 21 of the 24 items were reasonably homogeneous; again supporting a unidimensional interpretation of the MAST.

How well does the observed factor structure of the present sample correspond with factor structures that have been reported in the literature? If the MAST measures a unitary construct, one would expect that: (1) multidimensional factor structures would be sample specific and, therefore, there would be little consistency between the present factor structure and multidimensional factor structures previously reported in the literature; and (2) the items, in the present sample, would load significantly on a single factor. To test these hypotheses, we ran a series of confirmatory factor analyses.

Zung (1978) provided an early report of a multidimensional factor structure of the MAST in an alcoholic sample, and, as with the present sample, the first factor accounted for nearly 4 times as much variance as any of the remaining factors. The factor structure reported by Zung (1978) was as follows:

Insert Figure 2 Here

If the Zung (1978) model were a good fit to the present data, one would expect a non-significant chi-square with a probability nearing the value of 1. In contrast, the chi-square for the present data was significant ($c2 = 612.98$, $df = 189$, $p < .0001$) and, therefore, indicative of a poor fit. Chi-square values are, however, frequently significant with large samples (James, et al., 1982); therefore, it is necessary to examine additional indices of fit in order to determine the degree to which the model fits a given sample. Additional indices based upon the capacity of the model to reproduce the correlation/covariance matrix (Newman, Fraas, & Norfolk, 1995) also indicated that the model was a poor fit the present sample: (a) Comparative Fit Index (Bentler, 1990) = .514 (a good fit would be indicated by values approaching 1), (b) Parsimony Goodness of Fit (Mulaik, et al., 1989) = .491 (a good fit would be indicated by values approaching 1), (c) Root Mean Square Error of Approximation (Browne & Cudeck, 1993) = .166; (a good fit would be indicated by values of .05 or less), and (d) the Binomial Index of Model Fit on the best fitting factor Marital Discord (Newman, Fraas, & Norfolk, 1995) = .09 (a good fit would be indicated by values less than .05). The Zung (1978) model was, therefore, concluded to be a poor fit for the data in this sample.

In turn, Friedrich, Boriskin, and Nelson (1978) provided an oblique 6 factor solution for the MAST in a DUI offender sample, but this, too, proved to be a poor fit for the present data ($c2 = 504.0629$, $df = 238$, $p < .0001$; CFI= .741; PGFI = .583; RMSEA = .118; and, the Binomial Index of Model Fit on the best fitting factor - Early Effects of Alcoholism = .27). Likewise, an orthogonal four-factor solution reported by Zung (1980) in a sample of psychiatric outpatients was also found to be a poor fit for the present data ($c2 = 555.762$, $df = 209$, $p < .0001$; CFI= .647; PGFI = .567; RMSEA = .144, and

Binomial Index of Model Fit on the best fitting factor – Discord = .11). In sum, none of the multidimensional factor structures that were tested fit the present data well. While each of these studies reported a strong first factor, the secondary factors appear to be sample specific. The present data provided partial support for a unidimensional interpretation since the data were not consistent with any of the previously reported multidimensional factor structures.

A unidimensional interpretation would be further supported if the items of the MAST were found to load significantly on a single factor. Thurber et al. (2001) reported that the 21 of the 24 items of the MAST (excluding items 17, 24, and 25) were internally consistent and reflective of a homogeneous underlying construct. In the present sample, these 24 items all loaded significantly on a single factor. Despite this, traditional indices of model fit (which are based on the capacity to reproduce the covariance matrix) indicated a poor fit for the data ($c2 = 517.509$, $df = 195$, $p < .0001$; CFI= .666; PGFI = .578; and RMSEA = .144). The Binomial Index of Model Fit (.0000) indicated that the single factor model provided a good fit for the present data in that the t-value of each of the paths from the factor to the items was significant and the sign (direction) of each path was consistent with a positive additive model.

The MAST has been shown to have a strong primary factor that accounts for approximately half of the variance in the measure. The results of the present study are consistent with this trend. In the present sample, the MAST produced a strong first factor that accounted for over half of the variance in the scores. In turn, when the factor structure of the present sample was compared with several multidimensional factor structures, it was found that the multidimensional factor structures provided a poor fit for

the current data. This, too, supports a unidimensional interpretation of the scale. Finally, the present study demonstrated that the items in the MAST do load on a single underlying construct.

Discussion

The Council for Accreditation of Counseling and Related Educational Programs (CACREP) Accreditation Manual (CACREP, 2001) standards fail to address the substance abuse education counselors receive at the graduate level (Whittinghill, 2002). As such, no nationally recognized professional standard exists for the training of counselors in the areas of assessment and treatment of chemical dependence. Despite this paucity, diagnostic prevalence data indicate that counselors do and will continue to conduct assessment and treatment of persons with alcohol abuse and dependence disorders. Virtually every category of DSM recognized diagnoses calls for counselors to consider the impact of substances when evaluating a client's presenting symptoms. For these reasons especially, counselors need to be able to screen for the presence of substance abuse and dependence in their clients. This paper examined several psychometric facets of one of the most popular alcohol screening measures—the Michigan Alcoholism Screening Test (MAST: Selzer, 1971). The discussion section will address each facet in the order in which they were presented in the introduction.

Question 1: Does family history influence MAST scores?

Insofar as much that the SASSI FAM scale represents an indication of clients' likelihood of having been raised with substance abusing family member, personal family background was found to be unrelated to non-alcohol dependent persons' MAST scores. It may be that these clients were savvy enough to understand that the MAST is focused

on one's own personal alcohol use and consequences thereof and were therefore able to avoid the influence of familiar drinking history in their responses. Our data suggests that we have preliminary evidence to support a conclusion that the MAST is not unduly influenced in such as manner as to elevate a non-dependent person's scores to the same degree as might be expected of a truly dependent person.

Our results are contrary to those presented by Silber, Copan and Kuperschmit (1985), who found that MAST respondents misunderstood the questions about being a normal drinker and attending AA. The disparity in these findings suggests that counselors and researchers heed recommendations to amend these questions such that they reflect personal alcohol use (Martin, et al. 1990). We also offer the following cautions. While the SASSI negative group's MAST scores were significantly lower than those of the SASSI positive group, the former group's mean MAST scores were nearly two points above the recommended cut-off to be classified as having alcohol problems. Keeping in mind that the MAST is intended for use as a screening tool and not for use in isolation of clinical judgment (Skinner & Charalampous, 1978), it may be preferable for a screening instrument to be overly sensitive than to under classify persons who might truly need chemical dependence counseling (Moore, 1972). As such, clinicians and researchers are advised to review specific item responses for persons scoring at or around the recommended cut-off score of seven. Finally, previous researchers have suggested that the MAST's effectiveness as a screening instrument can be improved by increasing the cut-off score to the low teens (Conley, 2001; Ross et al., 1990). Additional research is needed to determine the optimal cut score for use in an outpatient setting.

Question 2: Does MAST item homogeneity influence classification effectiveness?

A review of the frequency of MAST items answered by the SASSI-3 negative subgroup is informative. A total of 15 MAST items (2-4, 8, 12-19, & 21-23) were endorsed by 10% or less of the SASSI-3 negative subjects. The MAST items this subgroup most often endorsed contained themes of being a normal drinker (1), being arrested for drinking-related behaviors (24) and being arrested for a drunk driving (25). This pattern is not surprising. Persons who are abstinent or drink infrequently might indeed see themselves as abnormal drinkers. This may especially be true of someone whose frame of reference includes abusive drinking as a normative experience. Such a mindset could lead a client to respond negatively to the MAST question inquiring about being a normal drinker. Such an approach would earn the client two points toward the MAST total score. Additionally, a significant portion of these clients was referred for assessment due to an arrest for driving under the influence of alcohol (DUI). It is possible to be arrested for a DUI without meeting Diagnostic and Statistical Manual of Mental Disorders IV criteria for alcohol abuse or dependence (American Psychiatric Association, 1994). If a non-dependent client responded honestly to the MAST, this person could earn a total of six points for being arrested for a DUI and not being a normal drinker. If, in addition to being referred for an assessment, had this client had also been mandated to attend a meeting of Alcoholics Anonymous, his MAST score would be elevated to 11. Despite these concerns, it is clear from our item analyses that the SASSI-3 negative subgroup approached the MAST very differently from the SASSI-3 positive subgroup. The language of the MAST did not serve to artificially inflate the MAST scores to a level comparable with those who were classified as alcohol dependent;

however, MAST scores in the non-dependent group were much higher than would otherwise be expected.

It is not surprising that MAST questions regarding complications typical of late-stage alcohol dependence were infrequently endorsed in this outpatient population. Our sample's mean age was 32 years. While not universally true, symptoms such as liver trouble, delirium tremens, and psychiatric hospitalization due to alcohol use generally take multiple years of alcohol dependence to develop (Milam & Ketcham, 1983; Royce, 1989). It is unlikely that a relatively young population would have experienced these symptoms, even if they did meet criteria for alcohol dependence.

Also, the treatment facility at which these data were collected provides only outpatient alcohol abuse and dependence treatment. Persons whose alcohol dependence treatment needs exceeded the services available at this facility may have been referred elsewhere prior to having an opportunity to participate in the screening process. Thurber et al. (2001), who collected MAST responses at an outpatient drug treatment center, found that these three items were infrequently endorsed. As such, our item frequency findings may be related to a bias in the data collection as opposed to a limitation of the MAST's item composition. Future researchers may wish to replicate these methods in a setting that provides a fuller range of alcohol and drug treatment services.

Question 3: Does the MAST identify alcohol problems or the willingness to declare the same?

The agreement between obvious (MAST) and subtle (SASSI) approaches to measuring alcohol dependence was no better than might be expected by chance. The MAST did not detect those alcohol dependent clients whose classification was based

either on defensiveness or denial. The MAST failed to identify those persons who were classified as dependent on the SASSI solely on the basis of subtle criteria. Clearly, the significant relationship between defensiveness and MAST scores indicates a weakness in this instrument. Counselors and researchers should be aware of and sensitive to the presence of client denial and defensiveness when using the MAST. The MAST does not have a built-in measure of client defensiveness. Therefore, it is recommended that those who elect to use the MAST consider incorporating an independent measure of defensiveness such as the Marlow-Crowne Social Desirability Scale (Crowne & Marlow, 1960).

Question 4: What, if any, relationship exists between respondent demographics and MAST scores?

MAST scores were unrelated to gender, socioeconomic status, and age. One implication of these findings is support for the commonly held view of alcohol dependence as an "equal opportunity illness". Such findings may be useful for counselors who work with people whose defenses pose objections to a diagnosis of alcohol dependence. For example, a client may feel that he is too young, too educated, or too financially secure to be alcohol dependent. Counselors can rest assured that arguments such as these are not empirically sound.

While representative of the geographic region in which these data were collected, the authors recognize that the sample's composition limits the generalizability of these findings. For example, this sample was composed almost completely of European Americans. While we know of no empirical or theoretical reason why persons of other ethnic backgrounds might present differently on the included measures, we place high

value on the principles of inclusion and diversity and therefore encourage future researchers to consider replicating these methods in samples that are representative of a broadly defined diverse population.

Question 5: What is the MAST measuring?

One purpose of factor analysis is to identify the underlying constructs measured by an instrument in order to facilitate scoring and interpretation. In turn, one of the underlying assumptions of a unidimensional scale is that the items are additive and measuring the same underlying construct. To the extent that the items load on the single factor, it is appropriate to add those items to construct a total score for the scale. This study supports a unidimensional interpretation of the MAST in that: (1) the factor structure of the present sample included a primary factor which accounted for 55% of the variance in the measure, (2) multidimensional factor structures (secondary factors) reported in the literature appear to be sample specific and provided a poor fit to the present data, and (3) the items from the present sample loaded on a single underlying construct in a manner that was consistent with an additive scoring method. As such, counselors and researchers using the MAST in similar populations to this study can rest assured that they are measuring a single alcohol problems construct.

Summary and Conclusion

The Michigan Alcoholism Screening Test (Selzer, 1971) is widely regarded as the gold standard of alcohol screening measures among both clinicians and researchers. The MAST has withstood the test of time and psychometric inquiry. Bearing in mind the influence of client impression management, our study provides additional and unique support for the use of the MAST as a measure of alcohol related problems in an

outpatient setting. Future researchers are encouraged to study the MAST in the context of a broadly defined diverse population that represents multiple alcohol treatment stages. Future researchers may also wish to structure investigations of the MAST in such a manner as to investigate its concurrent validity with other well known face-valid and subtle measures of alcohol dependence.

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Table 1

MAST and SASSI-3 Community Counseling Center Clients (N = 94)

Descriptive Data

Scale	M	SD	range
MAST	16	13.5	0-52
FVA	8.2	8.9	0-34
DEF	5.4	2.6	1-10
FAM	8.6	2.0	4-13

Note. FVA = SASSI-3 Face Valid Alcohol Scale; DEF = SASSI-3 Defensiveness Scale; FAM = SASSI-3 Family vs. Control Scale.

Table 2

MAST and SASSI-3 Pearson Correlation Matrix

Scale	1	2	3	4
	Subjects (N = 94)			
1. SOS-10	--	.78*	-.49*	-.40*
2. FVA		--	-.62*	-.52*
3. DEF			--	-59*
4. FAM				--

Note. FVA = SASSI-3 Face Valid Alcohol Scale; FVOD = SASSI 3 Face Valid Other Drug Scale; SYM = SASSI-3 Symptoms Scale; DEF = SASSI-3 Defensiveness Scale; SAT = SASSI-3 Subtle Attributes Scale.

* $p < .001$. All correlations were two-tailed.

Table 3

MAST Factor Pattern

Item	Factor	Factor 2	Factor 3	Factor 4
1	.45136	-.64904	-18281	.25113
2	.65618	.08916	-.13454	.03843
3	.74621	.01748	-.26360	.24223
4	.68693	-.33713	.00247	.02182
5	.61468	.28712	-.40759	.11892
6	.40911	-.73676	-.10168	.20300
8	.51418	-.32469	..17959	.03703
9	.45619	.35887	.21502	-.07163
10	.36255	.25072	-.59271	-.09386
11	.63886	.16130	-.31718	.04751
12	.74676	.12436	.16874	.00143
13	.84551	.00908	-.06501	.21245
14	.64258	-.04831	.28224	.07165
15	.64559	-.14664	.38646	.06306
16	.74359	.00548	.14757	.03404
17	.77279	.07666	-.13489	-.13626
18	.27442	.16084	-.06677	-.11401
19	.46450	-.25107	-.04985	-.29406
20	.77805	.24844	-.03109	-.16263
21	.62663	-.03554	.06054	-.41489
22	.55308	.04011	.28491	-.27189
23	.65038	.04913	.18156	-.34295
24	.28151	.40795	.21541	.47350
25	.26345	.30947	.26216	.50836
Eigen values	8.63928	1.95491	1.37041	1.24281
Variance Explained	55.39%	12.53%	8.79%	7.97%

Note. Factor pattern as result of factor analysis with squared multiple correlations in the diagonal.

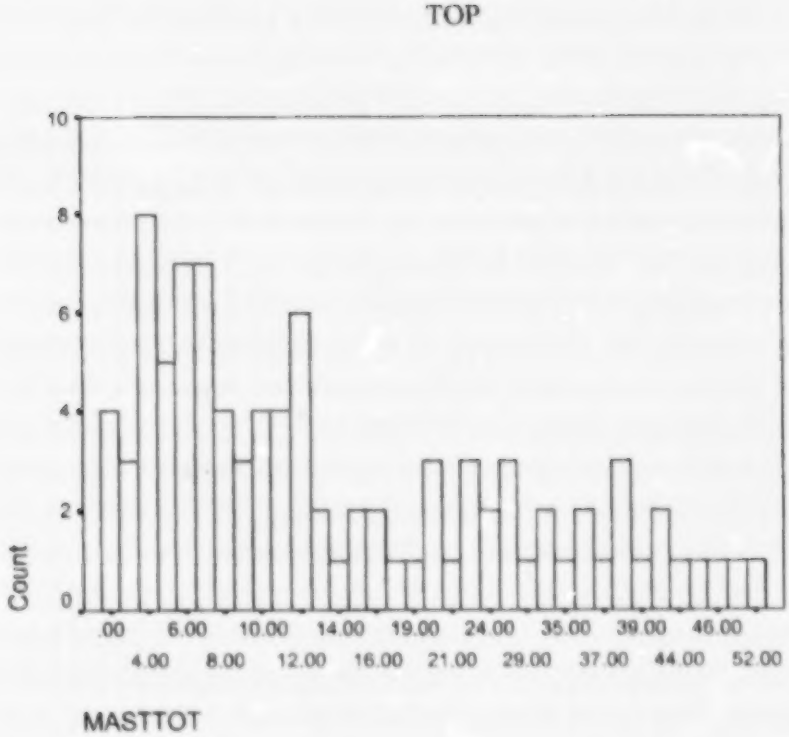
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Figure 1

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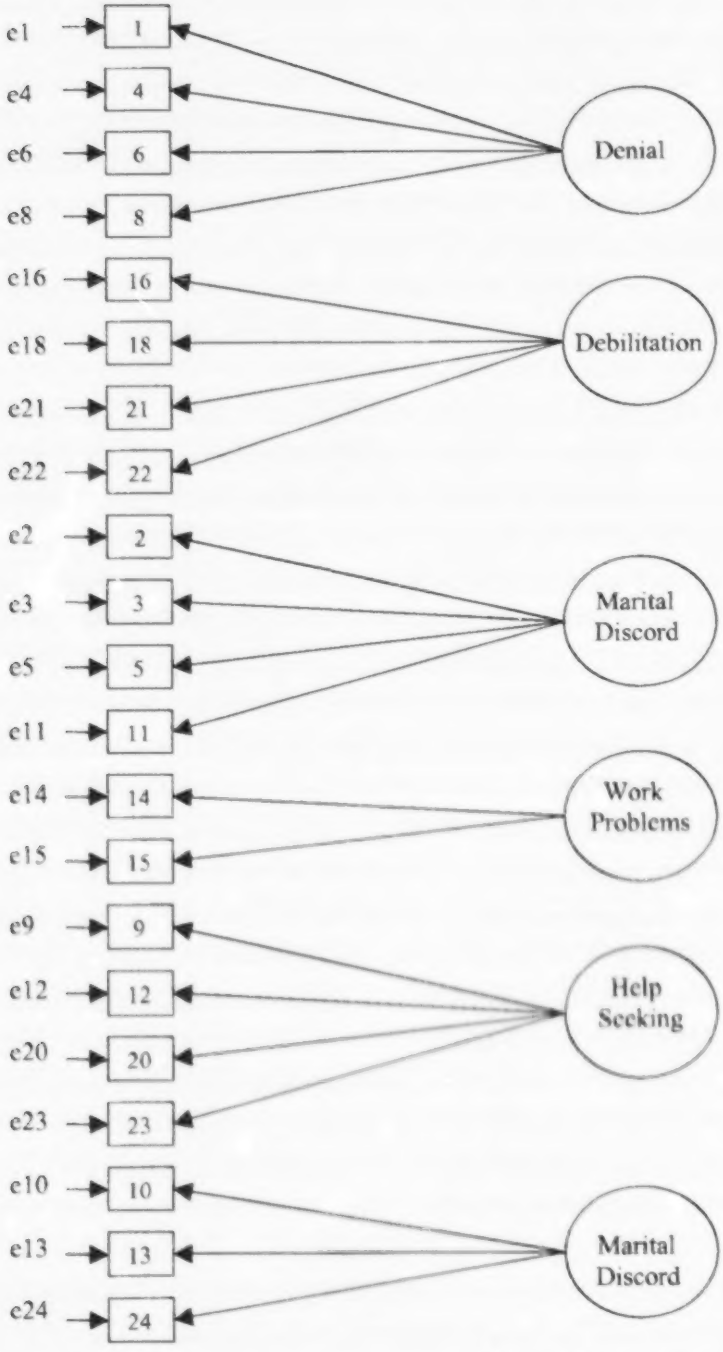
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Marital Discord
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e15
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Work Problems
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Help Seeking
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24
Marital Discord

Figure 2

Figure Captions

Figure 1. Distribution of MAST total scores (N = 94).

Figure 2. Factor structure for alcohol dependents reported by Zung (1978)

Author Note

The authors would like to thank Jennifer L. Young, Counseling and Consultation Services, The University of Wisconsin, for her thoughtful comments and review of this article.

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